

DRAFT SOW SECTION C

DESCRIPTION/ SPECIFICATION/ WORK STATEMENT

FOR

JOINT LIGHT TACTICAL VEHICLES (JLTV)

VERSION 1.0

(Changes made since TD phase SOW have been highlighted in blue)

29TH JUNE 2010

1 GENERAL

1.1 Introduction

The Contractor shall develop, design, model, and simulate the Joint Light Tactical Vehicle (JLTV) Family of Vehicles (FoV) per the JLTV Purchase Description.

The Contractor shall fabricate, test, and deliver selected sub-configurations of the JLTV FoV and associated companion trailers. The JLTV FoV encompasses the sub-configurations listed below, and further defined in the Purchase Description:

1.1.1 Payload Category A

- Sub-configuration General Purpose Mobility (Army/USMC) – (JLTV-A-GP)
- Sub-configuration Heavy Guns Carrier (Army/USMC) – (JLTV-A -HGC)
- Sub-configuration Close Combat Weapons Carrier (Army/USMC) – (JLTV-A -CCWC)
- Sub-configuration Reconnaissance (Army)- (JLTV-A-Recon)

1.1.2 Payload Category B

- Sub-configuration Infantry Carrier, Fire Team (Army/USMC) – (JLTV-B-IC)
- Sub-configuration Reconnaissance (Army) – (JLTV-B-Recon)
- Sub-configuration Battle Command On The Move (Army/USMC) – (JLTV-B-BCOTM)

1.1.3 Payload Category C

- Sub-configuration Shelter Carrier / Utility / Prime Mover (Army/USMC) – (JLTV-C-UTL)
- Sub-configuration Ambulance (2 Litter) (Army/USMC) – (JLTV-C-Amb)

1.2 Scope

This Statement of Work (SOW) encompasses the Engineering and Manufacturing Development (EMD) phase of the JLTV acquisition program. All references to meetings, conferences, and reviews, as well as documentation, shall pertain only to the EMD phase unless specifically stated otherwise.

1.2.1 Design Requirements

The Contractor shall employ a non-concurrent build schedule, based on program priorities and IAW the Government Integrated Master Plan (IMP) to develop designs for all JLTV sub-configurations (including trailers) in sufficient detail to insure that any unique requirements or design features of those sub-configurations are accounted for in the design of the JLTV FoV.

1.2.2 Fabrication Requirements

The Contractor shall further design, fabricate, test, and deliver the following JLTV sub-configurations ("deliverable sub-configurations") and their associated trailers, as well as representative armor coupons and ballistic hulls.

The additional design effort for these sub-configurations shall be of sufficient detail (to include components and subcomponents) to support a Critical Design Review and the fabrication and test of the following demonstration vehicles.

1.2.2.1 EMD Base Vehicles

The following EMD Base Vehicles, including associated trailers, shall be fabricated and tested by government and contractor [specific details TBD]:

- JLTV-A-GP (General Purpose Mobility)
- JLTV-B-BCOTM (Battle Command On The Move)
- JLTV-C-Utl (Utility Vehicle-Shelter Carrier-Prime Mover)

1.2.2.2 EMD High Priority Vehicles

The following EMD High Priority Vehicles shall be fabricated and limited testing is to be conducted by government and contractor [specific details TBD]:

- JLTV-A-HGC (Heavy Guns Carrier)
- JLTV-A-CCWC (Close Combat Weapons Carrier)
- JLTV-A-Recon (Reconnaissance)
- JLTV-C-Amb (Ambulance (2 Litter))

1.2.2.3 EMD CDR Design Only

The remainder of the JLTV FoV shall be designed to CDR level only, but the option remains to fabricate and test the following vehicles after Milestone C:

- JLTV-B-IC (Infantry Carrier(s))
- JLTV-B-Recon (Reconnaissance)

1.2.3 Sub-configurations

The JLTV Family of Vehicle design shall maximize commonality within JLTV payload categories, and across payload categories, as a key means of reducing life cycle cost.

A single vehicle may be used for multiple sub-configurations provided that all PD requirements for each applicable sub-configuration are met.

1.2.4 Companion Trailers

There shall be no more than one (1) companion trailer configuration per payload category. A single trailer configuration may be used across multiple payload categories, provided that all PD requirements for each payload category are met. Trailers shall be fabricated and tested IAW the schedule for the EMD Base Vehicles.

2 PROGRAM STRUCTURE & MANAGEMENT

2.1 Integrated Product Teams (IPTs)

Integrated Product Teams, both Contract and Program, shall be established to serve as the primary management tool and key method of communication for this contract.

The first Contract IPT meetings shall be held concurrently with the start of work meeting (SOWM).

Contract IPT meetings shall be held as agreed between the Government and Contractor. For purposes of this Contract, any joint deliberative or task-focused body, regardless of its formal or informal title, (e.g., "Working Group", Integrated Design Team, etc.) shall be considered an Integrated Product (or Process) Team, or "IPT."

The Contractor shall be responsible for developing all Contract IPT agendas and meeting minutes.

The Contract IPT meeting agenda shall be made available to the Government and discussed at subsequent IPT meetings.

2.1.1 IPT Structure

The number, composition, functionality, and responsibilities for IPTs shall be proposed by the Contractor at the SOWM and be jointly determined thereafter.

At a minimum, the proposed IPT structure shall include the following teams: Project Management, Business Management, Acquisitions, Systems Engineering, C4ISR, Supportability & Logistics and Test & Evaluation.

Systems Engineering IPT shall also include the following sub-IPTs: Force Protection, Mobility, Weapons, Safety & Survivability, HFE/HFI, Suspension/Steering/Brakes, Transportability, Trailer/Exterior Attachments, Reliability & Maintainability, Modeling & Simulation and Manufacturing & Producibility.

C4ISR IPT shall include the following sub-IPTs: Electronic Architecture, C4ISR Integration, Software, Power Management and Information Assurance.

IPT Leaders and Co-Leaders shall be jointly agreed upon no later than the SOWM.

Throughout the life of this contract, both Contractor and Government IPT members shall have the responsibility to propose new or modified IPTs when needed to focus efforts or improve effectiveness.

Proposals for new IPTs or structure shall be submitted in writing to the next higher IPT, with a copy provided to the Government.

The next higher level IPT shall be empowered to make decisions on IPT structure changes.

2.2 Integrated Master Plan (IMP)

The Contractor shall develop and deliver a detailed IMP that supports the Government IMP. The Government IMP outlines the main objectives of the program, and the main categories of work to accomplish each objective.

2.3 Integrated Master Schedule (IMS)

The Contractor shall develop an IMS that supports the Contractor-developed IMP. All high level tasks shall be linked together in an IMS IAW the IMP. Lower level tasks shall be embedded, and linked together (predecessors and successors, chronologically), within the next higher level task. Tasks shall be embedded and linked in parallel with the WBS. Each task shall identify required resources. The project scheduling tool shall have a Critical Path feature.

2.4 Advanced Collaborative Environment (ACE)

The Contractor shall use the existing Government furnished ACE to facilitate information sharing between JLTV program participants. The ACE shall be used to track issues, decisions, approvals, etc, as well as serve as the location for designated contract deliverables to be submitted. ACE is based on Parametric Technology Corporation's (PTC) Windchill suite. The ACE shall be used as an information sharing/collaboration environment that provides controlled, distributed access to all unclassified JLTV program information, both released and in work, to facilitate the program's business processes. The ACE shall be used by JLTV program participants including subcontractors and Government support contractors, as necessary, to facilitate real-time distribution and controlled access of information during program execution. Types of information that shall be processed and maintained by the ACE include JLTV program documents/reports, program management data, meeting-related information, modeling and simulation/analysis data, product data supporting design reviews, pertinent manufacturing information, and test data, consistent with the JLTV Security Classification Guide. The Contractor shall send ACE links to the Government IPT representative(s) when new or updated documents are posted.

3 COST/SCHEDULE CONTROL

The Contractor shall collect and analyze data, and prepare documents including the Cost and Software Data Reports (CSDR) (consisting of the Contractor Cost Data Reports (CCDR) and Software Resources Data Reports (SRDR)), Contract Performance Reports (CPR), and Contract Funds Status Reports (CFSR).

3.1 Cost and Software Data Reports (CSDR)

The Contractor shall systematically collect and report actual contract costs.

The Contractor shall use the CAIG-approved JLTV contract cost and software data reporting (CSDR) plan, DD Form 2794, and the WBS Dictionary as the basis for the following:

Within forty five (45) days after contract award, the Contractor shall meet with the Government to review the JLTV CSDR contract plan.

As a result of the JLTV CSDR contract plan meeting, the Contractor shall either accept the JLTV Contract Plan or propose revisions.

The plan shall only be revised if the Government and Contractor mutually agree to all substantive changes.

The final approved contract CSDR plan shall be incorporated into the contract.

The contract CSDR plan shall include all levels of the program WBS and any lower level WBS elements designated by DoD as being major cost drivers, high risk or high technical interest.

The Contractor shall further extend the WBS for its own reporting purposes.

The Contractor shall prepare the CWBS dictionary using the WBS included in the approved final CSDR plan.

The Contractor shall maintain and update the CWBS and dictionary during contract execution.

Submittals will be no more frequent than CCDR reports.

The Contractor shall prepare and provide CCDR reports IAW approved contract CSDR plan.

In preparing the Software Resources Data Reports (SRDR), the Contractor shall customize or tailor the sample formats to be consistent with data it normally collects.

The Government shall approve any customized or tailored formats proposed by the Contractor.

The Contractor shall provide a SRDR Data Dictionary with any approved customized formats.

The Contractor's customized SRDR and Data Dictionary shall be reviewed to determine if the report captures the Government's stated need.

The Contractor's customized SRDR and Data Dictionary shall be reviewed to determine if the data provided is integral to the Contractor's normal oversight and management cost accounting procedures.

Flow down CSDR requirements to any lower tier Contractor that shall have a contract valued at over \$50 million (FY 2002 dollars) or any contracts valued at between \$7 million and \$50 million (FY 2002 dollars) that are designated by the Government as being high risk or high technical interest.

3.2 Contractor Integrated Performance Management

The Contractor shall establish, maintain, and use an integrated performance management system in the performance of this contract.

Central to this integrated system shall be a validated Earned Value Management System (EVMS) in accordance with DFARS 252.234-7002.

3.3 Contractor Performance Management System

The Contractor's system shall meet the requirements in this contract and the Contractor's own documented System Description.

Contract Performance Report (CPR) information shall be presented at significant management and design reviews as an agenda item.

The presentation shall include discussion of progress and problems.
Technical issues shall be covered in terms of performance goals, exit criteria, schedule progress, risks and mitigation, and cost impact.

3.4 Integrated Baseline Review (IBR)

The Contractor shall participate jointly with the Government in an IBR to evaluate the risks inherent in the contract's planned performance measurement baseline.

The IBR shall verify that the Contractor is using a reliable performance measurement baseline, which includes the entire contract scope of work, is consistent with contract schedule requirements, and has adequate resources assigned.

The IBR shall also record any indication that effective Earned Value Management (EVM) is not being used.

[The IBRs shall be conducted on subcontracts based upon the criticality of the item being acquired or on those items that meet or exceed EVM dollar value thresholds.](#)

The prime Contractor shall coordinate and lead subcontractor IBRs, with participation by the Government. See Meetings / Conferences / Review section for IBR timing.

3.5 Integrated Program Management Reporting

The Contractor shall report EVM data as applicable to this contract in accordance with the requirements stated herein.

All contractors reporting shall correspond to applicable Contract WBS elements.

3.5.1 Contract Performance Report (CPR)

Reporting to the Government shall be at all levels of the program WBS.

3.5.2 Contract Funds Status Report (CFSR)

The Contractor shall develop and deliver a CFSR.

The Contractor shall reconcile reporting elements in the CFSR with the CPR when these documents are submitted in the same month.

The Contractor shall provide a reconciliation of the CFSR with CPR as an addendum to the CPR.

4 RISK MANAGEMENT

4.1 Risk Management Plan

The Contractor shall develop, implement, and deliver a Risk Management Plan following the concepts in the RISK MANAGEMENT GUIDE FOR DOD ACQUISITION, Sixth Edition (Version 1.0) dated Aug 2006.

The Contractor Risk Management Plan shall encompass all program and system levels to identify and mitigate program risks in the areas of cost, schedule, and performance.

The Contractor Risk Management Plan shall at a minimum address:

- Risk Management Strategy and Process
- Responsible/Executing Organization
- Risk Management Process and Procedures
- Risk Identification
- Risk Analysis
- Risk Mitigation Planning
- Risk Mitigation Plan Implementation
- Risk Tracking

4.2 Risk Reporting

Risk management shall be an integral part of all technical reviews, risk review board meetings, periodic program management reviews, meetings, and IPTs.

The Contractor shall participate monthly via teleconference in the Government Risk IPT.

The Contractor shall systematically identify, analyze, and report risk mitigation activities for all moderate and high-risk areas.

Risk reporting shall present standard probability and consequence-screening criteria consistent with the JLTV Risk Probability and Consequence Screening Criteria.

The details regarding consequences for cost, schedule, and performance shall be documented in each Risk Mitigation Plan.

The Contractor shall make available risk assessments and risk mitigation status through the IPT process and via the ACE.

Risk Tracking Reports shall include:

- A brief description, including both the title and type, of the Risk
- A brief description of the Risk root causal factor(s)
- An assessment of the risk's likelihood and the estimated severity of its effect on the program if mitigation fails
- The planned mitigations, along with critical dates (risk reduction milestones), that address the root cause(s) and effect(s)

5 MEETINGS/CONFERENCES/REVIEWS

5.1 Participation/Logistics

The Contractor shall constructively participate in the meetings, conferences and reviews required in this scope of work.

Wherever possible, meetings shall be conducted by electronic means.

Physical meetings shall be scheduled in tandem, or groups, to minimize personnel resources and travel expenses.

All program and technical meetings, conferences, and reviews shall be hosted by the Contractor.

5.1.1 Agendas

The Contractor shall submit an agenda and read-ahead package/briefing charts in Contractor format for all meetings, conferences and reviews called out in this section, C.5. No less than two weeks prior to the scheduled meeting, conference, or review.

The Government shall propose any changes to the agenda (or details in the content) no later than seven (7) days prior to the meeting, conference, or review.

The agenda for the Start of Work Meeting shall be jointly developed by the Government and Contractor.

5.1.2 Meeting/Conference/Review Minutes

The Contractor shall prepare and submit meeting minutes for all meetings, conferences and reviews called out in this section C.5.

All minutes shall be in Contractor format.

5.2 Start of Work Meeting (SOWM)

[The Contractor shall conduct a start of work meeting within two weeks after contract award.](#)

A System Requirements Review (SRR) shall be conducted as part of the SOWM.

Items to be accomplished at the SOWM/SRR shall be per the IMP.

5.3 Integrated Baseline Review (IBR)

[As referenced in C.3.5, the Contractor shall conduct an Integrated Baseline Review at the Contractor's facility within XX days of contract award to present the items required per the IMP.](#)

5.4 Program Management Reviews (PMR)

The Contractor shall conduct quarterly PMR's, with senior-level program management participation.

The Contractor shall present cost, schedule, performance, and risk status at each PMR and be prepared for detailed discussion with the Government.

PMRs shall be held in conjunction with Technical Reviews to limit meeting proliferation.

5.5 Technical Review Schedule

The Contractor shall deliver a proposed schedule at the Start of Work Meeting (SOWM) for the following technical reviews that support the required delivery of test vehicles.

The Government shall have final approval of the technical review schedule.

5.5.1 Preliminary Design Review (PDR)

The Contractor shall conduct a PDR in the vicinity of the Contractor's facility within XX days of SOWM, to present their preliminary and concept designs and M&S results for all JLTV sub-configurations.

PDR content, at a minimum, shall address the items in the IMP.

PDR shall be executed prior to the User Jury Review.

5.5.2 User Jury Review

The Contractor shall utilize a Contractor demonstrator vehicle, including all integrated Government Furnished and Contractor Furnished mission equipment (C4I, weapons, sensors, ammunition, automatic fire extinguishing system (AFES), BII, etc.) to conduct a structured user jury of both Soldiers and Marines (U.S. and International).

Soldiers and Marines including personal gear and equipment shall be made available to the Contractor, at the Contractor's facility, for duration of up to 4 days.

The Contractor shall provide a detailed User Jury Plan with dates per the IMP.

The User Jury Plan shall at a minimum include review of controls and displays, ingress/egress timing, spare tire change, soldier measurements at all seat locations, and situational awareness assessment.

The User Jury Review shall be conducted prior to CDR. There would be a minimum of one user jury review depending on the results.

5.5.3 Base Vehicle Critical Design Review (CDR-1)

The Contractor shall conduct a CDR to present their detailed designs and further M&S results for the Base Vehicle JLTV sub-configurations outlined in C.1.2.2.1, as well as any sub-configuration detailed design necessary to influence the FoV design.

CDR content, at a minimum, shall address the items in the IMP.

The CDR shall be conducted prior to initiation of Base Vehicle fabrication/build. Any fabrication/build initiated prior to CDR shall require written approval from the Government.

5.5.4 High Priority Vehicle Critical Design Review (CDR-2)

The Contractor shall conduct a CDR to present their detailed designs and further M&S results for the High Priority Vehicle JLTV sub-configurations outlined in C.1.2.2.2, as well as any changes that impact the Base Vehicle Designs at CDR-1.

The CDR content, at a minimum, shall address the items in the IMP.

The CDR shall be conducted prior to initiation of High Priority Vehicle fabrication/build. Any fabrication/build initiated prior to CDR shall require written approval from the Government.

5.5.5 Final FoV Critical Design Review (CDR-3)

The Contractor shall conduct a final FoV CDR to present their detailed designs and further M&S results for the remaining "Design Only" JLTV sub-configurations outlined in C.1.2.2.3, as well as any delta designs for the FoV.

The CDR content, at a minimum, shall address the items in the IMP.

The CDR shall be conducted prior to delivery of the High Priority Vehicle JLTV sub-configurations.

5.5.6 System Verification Review (SVR)

The Contractor shall conduct an SVR, a multi-disciplined product and process assessment to ensure the system under review can proceed into Low-Rate Initial Production and full-rate production within cost (program budget), schedule (program schedule), risk, and other system constraints.

The SVR content, at a minimum, shall address the items in the IMP.

The SVR shall be conducted either prior to, or concurrently with the Production Readiness Review (PRR). The SVR shall be held concurrently with the Functional Configuration Audit (FCA).

5.5.7 Functional Configuration Audit (FCA)

The Contractor shall conduct a FCA, the formal examination of the as tested characteristics of the JLTV FoV with the objective of verifying that actual performance complies with design and interface requirements in the functional baseline.

The FCA shall review of the JLTV FoV test/analysis data, including software unit test results, to validate the intended function or performance stated in its specification is met.

The FCA content, at a minimum, shall address the items in the IMP.

The FCA shall be held concurrently with the SVR.

5.5.8 Production Readiness Review (PRR)

The Contractor shall conduct a PRR to determine if the design is ready for production and if the prime contractor and major subcontractors have accomplished adequate production planning without incurring unacceptable risks that will breach thresholds of schedule, performance, or cost.

The PRR content, at a minimum, shall address the items in the IMP.

The PRR shall be conducted NLT 22 months after contract award.

5.5.9 Technology Readiness Assessment (TRA) Review

The Contractor shall conduct a TRA Review prior to Base Vehicle delivery.

The TRA shall evaluate system technology maturity based on the Work Breakdown Structure, score of the level of technological maturity, and verify achievement of TRL 7.

If TRL 7 hasn't been achieved for any component, the contractor shall provide a technology maturation plan at TRA detailing how TRL 7 is to be achieved by PRR.

The TRA content, at a minimum, shall address the items in the IMP.

5.6 Test Readiness Reviews (TRR)

The Contractor shall deliver a proposed schedule at the Start of Work Meeting (SOWM) for the following Test Readiness Reviews that support the required delivery of test vehicles.

The Government shall have final approval of the technical review schedule.

5.6.1 Base Vehicle Pre-Test Readiness Review (pre-TRR)

The Contractor shall conduct a Pre-TRR for the Base Vehicle configurations at least fourteen (14) days prior to the formal Base Vehicle TRR.

Pre-TRR content, at a minimum, shall address the items in the IMP and a Government provided Letter Of Intent (LOI) detailing test entrance criteria.

The LOI shall be provided thirty (30) days prior to the Pre-TRR.

5.6.2 Base Vehicle Test Readiness Review (TRR)

The Contractor shall support [TBD] the Base configuration Government TRR conducted at a Government specified location.

The TRR shall assess the readiness of the base JLTV sub-configurations to enter test.

The TRR content, at a minimum, shall address the items in the IMP.

The Government TRR shall be conducted within 7 days of vehicle acceptance (DD250).

5.6.3 High Priority Vehicles Pre-Test Readiness Review (pre-TRR)

The Contractor shall conduct a High Priority Vehicle Pre-TRR for the additional sub-configurations at least fourteen (14) days prior to the formal High Priority Vehicle TRR.

Pre-TRR content, at a minimum, shall address the items in the IMP and a Government provided Letter Of Intent (LOI) detailing test entrance criteria.

The LOI shall be provided thirty (30) days prior to the Pre-TRR.

5.6.4 High Priority Vehicle Test Readiness Reviews (TRR)

The Contractor shall support [TBD] the High Priority Vehicle Government TRR conducted at a Government specified location.

The TRR review shall assess the readiness of the base JLTV sub-configurations to enter test.

TRR content, at a minimum, shall address the items in the IMP.

The Government TRR shall be conducted within 7 days of vehicle acceptance (DD250).

5.7 Manufacturing Readiness Assessments

5.7.1 Manufacturing Readiness Assessment Baseline (MRA-1)

The Contractor shall conduct an MRA-1 in conjunction or within XX days of IBR. MRA content, at a minimum, shall address the items in the IMP.

5.7.2 Manufacturing Readiness Assessment Final (MRA-2)

The Contractor shall conduct an MRA-2 in conjunction or within 2 weeks of PRR. MRA content, at a minimum, shall address the items in the IMP.

6 PRODUCTION AND DEPLOYMENT (P&D) PLANNING DOCUMENTS

The Contractor shall provide input to support the development of the following Production and Deployment (P&D) documents and certifications.

Potential documents shall include the Consideration of Technologies Issues, Clinger-Cohen Act (CCA) and DIACAP Compliance, Spectrum Certification Compliance, Manpower Estimates, Core Logistics Analysis/Source of Repair Analysis, Technology Development Strategy, Modular Open System Architecture (MOSA), Technology Maturity Assessment, Component Cost Analysis, Test and Evaluation Master Plan (TEMP), Supportability Strategy, Integrated Logistics Assessment (ILA) and Systems Engineering Plan (SEP).

7 SYSTEMS ENGINEERING (SE)

7.1 General

The Contractor shall provide a Systems Engineering Management Plan (SEMP) supporting the concepts contained in the Government Systems Engineering Plan (SEP).

Together, the Government and the Contractor documents shall be used to guide all technical aspects of the program.

7.2 SEMP Requirements

The Contractor shall submit a SEMP that describes their integrated technical approach for the contract. The Contractor's SEMP shall include:

1. The contract requirements, tasks, activities, and responsibilities included in the Government SEP, as they relate to this contract, shall be aligned to the SEMP. If the Contractor proposes to change or revise the planned technical approach described in the Government's SEP, the rationale for the change shall be provided.
2. A description of the key technical and technical management processes. Provide Contractor's (and teammates, subcontractors, etc.) plans for continued process improvement.
3. Flow down of technical and technical management plans, processes, and requirements to the sub-contractors or teammates, and how they participate in the processes.
4. An event-based program plan (correlated and consistent with the Integrated Master Plan (IMP)) for the efforts involved with the design, development, fabrication, test, sustainment and technology insertion.
5. Planned technical reviews with entry and exit criteria and independent Subject Matter Expert (SME) participation.

6. Identity of the technical authority, stakeholders, and functional technical authorities on the program, and the limit and scope of their responsibilities.
7. A description of the technical organization within the program IPT structure identifying roles and responsibilities of key personnel, and technical staffing requirements. Identify the primary participants within each IPT and the supporting participants to include subcontractors. Include a summary of the principle products or processes of the IPTs.
8. Integration of the technical processes and technical management processes with IMS and EVM processes.
9. A summary description of the proposed set of program planning and specific plans (e.g. Software Development Plan (SDP), Risk Management Plan, etc).
10. A matrix that correlates the Government SEP, with the Contractor's SEMP and other program documents (e.g. SOW, IMP/IMS, WBS).

8 HARDWARE REQUIREMENTS

8.1 System Level Design Document

The Contractor shall develop a System Level Design Document (SLDD) that encompasses the JLTV FoV top level designs and subsystem designs.

This document shall logically flow from the JLTV Purchase Description and shall assign all functionality to Hardware or Software configuration items.

The SLDD shall be completed per the IMP and the SLDD information shall be made available to the Government and discussed at IPT meetings.

8.2 Systems Integration Lab (SIL)

The Contractor shall use a systems integration laboratory to integrate and test the JLTV system electronics and Line Replaceable Units (LRUs) or Configuration Items in a lab environment prior to full vehicle integration.

This lab shall allow the hardware and software sub-components as well as the complete electrical/electronic architecture to be interfaced together, tested, improved, and re-tested during the overall development of the JLTV FoV.

8.3 Problem Reporting Metrics

The Contractor shall use a closed loop problem tracking system to capture, track, and correct hardware problems.

The Contractor shall maintain metrics to track the number, type, and severity of open sub-system and system problem reports against the total number of closed reports.

The metrics shall be cumulative to show trends of problem report openings and closures over time.

These metrics shall be tracked from the beginning of integration and test to the end of the contract per the IMP.

The Problem Reporting metrics shall be available to the Government and discussed at IPT meetings.

8.4 Computing Resource Metrics

The Contractor shall track a set of computing resource metrics for the entire JLV FoV electrical architecture (not including GFE).

These metrics shall include peak processor throughput/utilization (per processor), volatile and nonvolatile memory usage (per board level or processor application), and Data bus throughput/utilization (per data bus).

These metrics shall initially be tracked as estimates and will be changed into actual over time as the development progresses.

These metrics shall be tracked from PDR to the end of contract per the IMP.

This metric information shall be available to the Government and discussed at IPT meetings.

8.5 Computing Resource Utilization

The Contractor shall utilize no more than 50% of any JLV sub-configuration's computer resources as a sound engineering margin to allow future growth.

The areas of the electrical architecture this shall be applied to are: processor throughput/utilization (per processor), volatile and non-volatile memory usage (per board level or processor application), and data bus throughput/utilization (per data bus).

8.6 System Requirement Compliance

The Contractor shall develop a requirements compliance matrix that tracks achievement of all JLV FoV PD requirements.

This matrix shall be initially developed as estimates and shall be matured into actuals as the development and test progress.

The matrix shall be logically organized and clearly depict estimates vs. actual compliance.

8.6.1 Engineering Change Proposal

The ECP shall provide detail technical, economic, design and or production reasons for the proposed requirement change, the cost of potential resolution, and the effect of resolution on other requirements.

Approval of the ECP by the government shall be considered a modification to the specification. If the ECP will grant only temporary relief, then the contractor shall demonstrate how they will return to compliance with the original specification.

8.7 Weight Accounting

The Contractor shall track each deliverable JLV sub-configuration weight using a detailed weight breakdown accounting matrix.

This matrix shall initially be estimates and shall transition to actuals as the development progresses.

This accounting shall take place per the IMP and will be updated monthly between major reviews.

The weight accounting information shall be available to the Government and shall be discussed at IPT meetings.

8.8 Power Budget Accounting

The Contractor shall track each deliverable JLV sub-configuration's hotel, on-board, and export power budgets using a detailed power budget breakdown.

This budget shall be in Contractor format and shall initially be estimates which shall transition to actuals as the development progresses.

This accounting shall take place per the IMP and will be updated monthly between major reviews.

The power budget accounting information shall be available to the Government and shall be discussed at IPT meetings.

9 SOFTWARE

9.1 Software Gap Analysis (SGA)

The Contractor shall perform a SGA to establish and document gaps between the capabilities of vehicle onboard systems or component subsystems relative to integration with other systems and/or established performance requirements as outlined in the Purchase Description (Attachment 1).

The following vehicle functional areas should be examined: VCS; Power Management and Distribution System; Controls and Displays; GFE component integration; and Onboard diagnostics and prognostics.

The SGA shall be completed IAW the Government provided IMP and the SGA information shall be available to the Government and discussed at IPT meetings.

9.2 Software Development Plan (SDP)

All embedded JLV software shall be developed in accordance with a Contractor developed SDP. The Contractor shall use its own corporate software standards in developing the SDP and shall tailor the SDP to program needs.

The SDP shall focus on Contractor developed software, but shall also address configuration management and the integration approach for NDI/COTS/GOTS/GFE software.

The SDP shall be developed IAW the Government provided IMP.

The SDP information shall be available to the Government and discussed at IPT meetings.

9.3 Software Build/Download Process (SB/DP)

The Contractor shall develop a Software Build/Download Process Document prior to the TRR. The SB/DP shall detail the process of compiling a complete software executable for all JLTV sub-configurations delivered under this contract including application, middleware, and any operating environments.

The process described shall start at source code and end with a downloading procedure to include operating system software.

The process described shall include how to integrate all software into the executables and shall be in sufficient detail to allow a third party Contractor or Government support activity to assemble and download a complete set of executables to the vehicles.

The SB/DP shall be completed IAW the Government provided IMP.

The SB/DP information shall be available to the Government and discussed at IPT meetings.

9.4 Source Code

All NDI/COTS/GOTS/GFE software shall be delivered in the vehicles with appropriate licenses and without restrictions for usage in its intended vehicle application.

[Any privately developed source code shall be delivered separately from the vehicles. This requirement flows down to all subcontractors.](#)

9.5 Capabilities Certification

The Contractor shall have and maintain at least a CMMI Level III Software Engineering Institute (SEI) certification for all business units and subcontractors performing software development work.

9.6 Software Metrics

The Contractor shall track progress against designated software development metrics per the IMP and will update the metrics monthly between major reviews. The software metrics shall address the following areas for all delivered sub-configurations of the JLTV FoV:

9.6.1 Software Design

This metric shall track progress of the software design process and shall be tracked in a logical breakdown by Software Configuration Item, mid-level Software Components, and lowest level Software Units/Modules. The Contractor shall track the requirements allocated to each software component and the percentage of requirements with completed software designs for each component. This metric information shall be tracked when software design begins and shall cease when it is complete. The metric information shall be made available to the Government and discussed at IPT meetings.

9.6.2 Source Lines of Code

This metric shall track the number of lines of code in a logical breakdown by Software Configuration Item, mid-level Software Components, and lowest level Software Units/Modules. The Contractor shall initially track the estimated number of source lines of code for each Software Configuration Item, mid-level Software Component, and lowest level Software Unit/Module at PDR, and roll the estimates to actual from month to month until the end of contract.

The progress shall be tracked against the plan, to provide indicator of progress versus plan.

The metric information shall be made available to the Government and discussed at IPT meetings.

9.6.3 Software Integration and Test

The Contractor shall track the number of integration and test procedures successfully completed against the total estimated number of integration and test procedures for each Software Configuration Item, mid-level Software Components, and the lowest level Software Units/Modules.

This metric information shall be tracked when software integration and test begins and shall cease when it is complete.

This metric shall be made available to the Government and discussed at IPT meetings.

9.6.4 Problem Reporting Metrics

The Contractor shall use a closed loop problem tracking system to capture, track, and correct software problems.

The Contractor shall keep a set of metrics to track the number, type, and severity of open software problem reports against the total number of closed reports.

The metrics shall be cumulative to show trends of problem report openings and closures over time.

The Problem Reporting metrics shall be made available to the Government and discussed at IPT meetings.

9.7 Software Detailed Schedule

The Contractor shall develop a detailed software schedule, covering all phases of software development.

The schedule shall include a software drop schedule for all major releases, broken down functionally to identify new capabilities and/or fixes introduced with the software drop.

10 INTEROPERABILITY REQUIREMENTS

10.1 Systems Interoperability

The Contractor shall be responsible for systems interoperability.

Systems interoperability shall, at a minimum, include interoperability of all hardware, software and, logistics systems included in the family of JLTVs.

Integration of GFE shall not degrade demonstrated performance of or interoperability between GFE components.

11 CONFIGURATION MANAGEMENT (CM)

11.1 Configuration Management

The Contractor shall maintain a CM process for the control of all hardware and software configuration documentation, media, and parts representing or comprising the JLTV FOV. Industry Standard ANSI/EIA-649A, IEEE 828-2005 - Standard for Software Configuration Management Plans, IEEE 1042, and Military Handbook MIL-HDBK-61A shall be used as guidance.

11.1.1 Configuration and Data Management Plan

The Contractor shall develop a configuration and data management (CDM) plan that addresses responsibilities, business processes and standards, methods/tools and procedures to identify, develop, document, record, control, store, transmit, implement, validate, and verify JLTV Conceptual Design Drawings/Models Technical Data and Simulation-based Design Model Data. Included in the CDM Plan shall be the process for management and control of Government Furnished Information e.g. drawings, models, and technical documents as integrated into the Contractor's JLTV design, analysis and engineering documentation.

12 LIFECYCLE PRODUCT DATA MANAGEMENT

12.1 Lifecycle Management System

12.1.1 Data Management System

The Contractor shall possess and utilize an authoritative product data, engineering or configuration data management system to manage, securely store, and track multiple versions and iterations of JLTV conceptual designs and related data.

The system shall manage digital representations of development product (part and software) items, associated product structures (bill of materials), product definition (engineering drawings, solid models, specifications and standards, software documentation, schematics, etc.),

computer-aided engineering (CAE) analysis models, testing and simulation results, and other related documentation.

12.1.1.1 Technical Data Development

The contractor shall develop as part of data management a technical data package which includes all applicable drawings, associated lists, specifications, standards, performance requirements, quality assurance provisions and packaging details necessary to ensure the adequacy of the JLTV FoVs' performance.

12.2 Technical data

The Contractor's JLTV systems design technical data generated and incorporated shall align (bi-directional traceability) with Government performance and interface requirements (purchase description).

Conceptual design data shall be developed, integrated, validated and delivered in the following content formats.

12.2.1 Simulation-based Design Model Data

The Contractor shall deliver Simulation-based design Computer Aided Engineering (CAE) model data for each vehicle configuration.

12.2.2 Developmental Design Technical CAD Data

The Contractor shall deliver Developmental Design Technical Data.

13 VEHICLE ELECTRICAL AND COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (C4ISR) SUB-SYSTEMS

13.1 C4ISR/EW Electronics A-Kit/B-Kit breakdown

The Government has defined [TBD] the minimal inclusion of electronics, data busses and wiring harnesses for the C4ISR/EW Electronics A-Kit in the Purchase Description.

The Contractor shall examine current GFE C4ISR/EW system components, installation kits and system functions and perform an analysis of moving additional GFE components into the JLTV Electronics A-Kit.

The analysis shall also include installation timings, any specialist equipment and training required for Electronics B-Kit components.

The JLTV Electronics B-Kit components shall be capable of installation by unit level maintainers.

The C4ISR/EW Electronics A-Kit/B-Kit breakdown shall be completed IAW the Government-provided IMP.

The C4ISR/EW Electronics A-Kit/B-Kit breakdown information shall be available to the Government and discussed at IPT meetings.

13.2 Antenna placement

The Contractor shall examine the co-site interferences involved in the placement of all antennas integrated onto the JLTV FoV.

Antenna placement shall not hinder the overall vehicle from meeting the requirements of the JLTV Purchase Description.

The Contractor shall develop antenna placement diagrams for the deliverable JLTV sub-configurations to address co-site interference issues and non Omni-directional antenna gain pattern issues.

The antenna placement information shall be completed IAW the Government-provided IMP and shall be available to the Government and discussed at IPT meetings.

13.3 Cross-Domain Approach

Net-centric warfare requires information sharing across security domains, which in turn, generates significant security challenges.

Traditional information assurance solutions to support cross-domain information sharing focus heavily on preventive measures, restricting information flow and reducing the risk of information compromise.

The Contractor shall develop a Cross-Domain approach for the JLTV FoV which will be delivered to and approved by the Government.

The proposed solution is to either have already been certified by the Unified Cross Domain Management Office (UCDMO) or, if the solution is not certified, the Contractor shall show a path or schedule to certification that will be reached by commencement of the Low Rate Initial Production (LRIP) Phase and provide a Product Assessment that details why the products certified by UCDMO are not suitable for the proposed solution.

The Cross Domain Approach shall be completed IAW the Government-provided IMP and the information shall be available to the Government and discussed at IPT meetings.

14 TECHNOLOGY & GROWTH PLAN

14.1 Technology & Growth Plan

The Contractor shall deliver the following report and review it IAW the Government-provided IMP.

The Contractor shall consider in its FoV design the growth capability/open architecture needed to accomplish performance improvements in the areas below, as well as a Technology Readiness Level assessment for the delivered sub-configurations.

14.1.1 C4ISR/EW Growth

The Contractor shall consider the future C4ISR/EW growth information during the design & development of the JLTV FoV.

The Contractor shall deliver a plan to migrate to the future C4ISR/EW components. At a minimum, the plan shall include the cost and schedule of migrating to the identified systems when they are fielded.

Interface Control Documents (ICD) shall be provided as Government Furnished Information (GFI) when possible.

Where ICDs are not available, the Contractor shall participate in a JLTV Interface Control IPT with the Government C4ISR community to define an architecture that will accommodate these systems.

14.1.2 Reliability Growth

The Contractor shall include a plan for an aggressive reliability growth program that could be implemented for subsequent program phases to meet objective reliability requirements.

The reliability growth program shall be in addition to the failure analysis and corrective actions for test incidents demonstrated during testing.

14.1.3 Fuel Efficiency System Optimization

The Contractor shall deliver a report that documents design and engineering trades made to optimize fuel efficiency of the JLTV FoV.

The report shall also provide a plan to reduce fuel consumption and a technology roadmap outlining a path to objective fuel efficiency values as defined in the Purchase Description.

At a minimum, the Contractor shall provide a description of technology candidates, design modifications, retrofit compatibility, and supporting theoretical calculations.

14.1.4 Power Generation Growth

The Contractor shall deliver a report that documents a plan to increase electrical power generation in order to meet Objective on-board and export power generation requirements as defined in the Purchase Description.

At a minimum, the Contractor shall provide a description of technology candidates, design modifications, retrofit compatibility, and supporting theoretical calculations.

14.1.5 Payload Growth

The Contractor shall deliver a plan for a technology roadmap to meet Objective payload requirements and a description of technology candidates and design modifications.

14.1.6 Diagnostics/Prognostics Growth

The Contractor shall deliver a plan to grow the developed vehicle diagnostics and failure data into a prognostics capability.

At a minimum, the plan shall include the cost and schedule of implementing prognostics.

The plan shall consider building the prognostics capability segmented by major subsystems and be capable of predicting and displaying fault data to the individual component/ LRU / LRM level.

14.1.7 Technology Readiness Level (TRL) Assessment

The Contractor shall deliver a TRL assessment of the technologies included in the delivered sub-configurations.

This assessment shall include at a minimum a description of the technology, the function it performs and how it relates to other parts of the system,

This assessment shall include at a minimum description of the environment in which the technology has been demonstrated and an analysis of the similarities between the demonstrated environment and the intended operational environment.

This assessment shall include at a minimum the TRL assigned to each technology. Reference DoD desk book 5000.2-R for Technology Readiness Level definitions.

15 MODELING AND SIMULATION

15.1 Contractor M&S

The Contractor shall develop and execute a Modeling and Simulation (M&S) Plan, in contractor format, as part of the design and trade processes that supports the IMP.

Content of the M&S Plan shall include, but not be limited to, key performance characteristics for Mobility (NRMM, Propulsion, Suspension, and Ride Dynamics), Thermal (Engine, HVAC, Electronics), Structure, Signature Management, Survivability (Vulnerability and Criticality), Transportability, Crash Worthiness and Reliability, Availability and Maintainability (RAM).

The M&S Plan shall address modeling and simulating the JLTV at all protection levels.

The Contractor's M&S output/results and the data used to create the models shall be made available to the Government (data per C.15.4 M&S Data Submissions) and discussed at IPT meetings.

15.2

The data used to support the M&S shall be consistent with the requirements of the Lifecycle Product Data Management section of this contract.

M&S data and results shall be used by the Contractor to support technical design reviews per the IMP.

15.3 M&S Data Submissions

15.3.1 Crashworthiness Analysis

The Contractor shall submit fully completed Safety and Crashworthiness data sheets for each vehicle configuration.

15.3.2 Propulsion System Analysis

The Contractor shall model and simulate the propulsion system of the deliverable JLTV sub-configurations.

The Contractor shall submit fully completed Vehicle Propulsion Data Sheets for each vehicle configuration.

15.3.3 Mobility and Ride Dynamics Analysis

The Contractor shall model and simulate mobility characteristics and vehicle dynamics of the deliverable JLTV sub-configurations.

The Contractor shall submit fully completed Vehicle Mobility and Dynamic data sheets for each vehicle configuration.

15.3.4 Operational Effectiveness Analysis

The Contractor shall submit fully completed Operational Effectiveness Analysis data sheets for each vehicle configuration.

15.4 Survivability Modeling

15.4.1 Vulnerability Analysis

The Government shall perform a ballistic vulnerability analysis based on models and data provided by the Contractor and Government testing.

The Contractor shall provide the following for the vulnerability analysis: Criticality Assessment and Structure and Armor Description and Performance.

The Contractor shall provide the Contractor-defined criticality assessment described below and additional detailed requirements which are listed in Vulnerability Analysis Data Requirements.

15.4.1.1 Criticality Assessment

The Contractor shall identify using a fault tree analysis the subsystems that, if damaged or destroyed, would cause one of the following defined vehicle kills:

15.4.1.1.1 Communications kill (C-kill)

The vehicle experiences a C-Kill if it is damaged to the extent that it can neither transmit nor receive information by its electronic communication equipment, and the damage is not repairable by the crew on the battlefield within a short time (<10 minutes).

15.4.1.1.2 Mobility kill (M-kill)

The vehicle experiences an M-Kill if the damage causes the vehicle to be incapable of performing any of the mobility requirements of its assigned mission, and the damage is not repairable by the crew on the battlefield within a short time (<10 minutes).

15.4.1.1.3 Firepower kill (F-kill)

The vehicle experiences an F-Kill if the damage causes the vehicle to be incapable of performing any of the firepower (self-defense) requirements of its assigned mission, and the damage is not repairable by the crew on the battlefield within a short time (<10 minutes).

15.4.1.1.4 Catastrophic kill (K-kill)

The vehicle suffers a K-Kill if the damage is so extensive that the vehicle is not economically repairable. Items carried on-board the vehicles whose detonation or ignition could result in catastrophic damage would be items such as ammunition, fuel, oil, hydraulic fluids, etc.

15.4.1.2 Structure and Armor Description and Performance

The Contractor shall provide models that accurately depict structure and armor thickness. For all threats defined in Annex E of the Purchase Description, the Contractor shall include data describing the weight, thickness, and theoretical performance of the structure and armor. The theoretical performance data shall include the types of threats that the armor is designed to defeat the velocity and distance at which the theoretic threats were fired, and the obliquity at which the threats impacted the armor. Actual armor test data shall be provided, if available, and shall include the residual penetration into the witness plate or the amount of the target (in inches or millimeters) that was remaining after defeating the threats.

15.4.2 Mine Blast Analysis

The Contractor shall perform mine blast analysis for each deliverable sub-configuration at each protection level.

The Contractor shall model the vehicle system comprising the wheel/tire assembly, chassis, suspension, engine, transmission, and internal components of the seat, restraint system, steering wheel/column, and interior cab area that may interact with an occupant in a blast event.

The Contractor shall provide model inputs comprising the material properties, assumptions used to model event, models/simulation, and model results for the driver, passenger, and crew acceleration data as identified in ITOP 4-2-508.

The Contractor shall provide model results for system performance by identifying cab/hull deformations or breaches located at the crew feet/pedal location, center of the cab, passenger feet location points, and seat connection points.

The Contractor shall provide acceleration profile for the vehicle system from the blast event location through the center of vehicle to the passenger area.

The mine blast event shall be defined as the threshold and objective requirements of the vehicle system as identified in the classified annex.

The deliverables shall be capable of allowing the Government to simulate the event and verify assumptions and methods without developing additional files.

15.4.3 Thermal Management

15.4.3.1 Thermal Signature

The Contractor shall provide the following information for the Government to perform a thermal analysis: data concerning the capacities, materials (including fluids), flow rates, temperatures at known operating points, and heat rejection of heat exchanges for the entire drive train, exhaust system, cooling system, and hydraulic system.

In addition, any data representing the heat generation of the engine and cab components shall be provided, such as: cooling system specifications, cooling fan specifications, return fuel system layout, hydraulic system layout and reservoir locations, coefficient of friction for brakes, front and rear differential specifications, engine specifications, transmission specifications, and crew heater locations.

15.4.3.2 Interior Thermal Management

The Contractor shall provide the following information for the Government to perform an internal thermal analysis: data concerning the entire internal configuration of the vehicle consisting of seating, storage racks, electronics placement and power requirements per unit, instrument panel, crew displays, gunner position, stowage, and HVAC specifications including heat exchanger heat rejection rates, system capacity, component sizes, refrigerant used, and flow rates and temperatures at any outlets.

In addition, any data representing the heat generation of the internal electronic components shall be provided.

16 ENVIRONMENTAL, SAFETY AND OCCUPATIONAL HEALTH

16.1 Safety Engineering Principles and Program

The Contractor shall maintain a System Safety Program in accordance with MIL-STD-882D and the Safety System Program Guidance.

The Contractor shall prepare a System Safety Program Plan (SSPP) that describes the planned safety tasks and activities necessary to execute a comprehensive and effective System Safety Program.

16.1.1 Safety Review Support

The Contractor shall provide support for formal safety reviews in support of the program i.e., Weapons Systems Explosives Safety Review Board (WSESRB), and Lithium Battery Review process.

16.1.2 Safety Engineering Principles and Program

The Contractor shall develop, implement, and maintain a system safety program, in accordance with MIL-STD-882D and the System Safety Program Guidance.

The Contractor shall prepare a System Safety Program Plan (SSPP) that describes the design strategy and approach for implementing system safety requirements into the systems engineering process to achieve acceptable mishap risk.

The SSPP shall define the objectives, responsibilities, and methods to be used for overall safety program conduct and control. The SSPP shall delineate the scope, tasks, schedules, milestones, responsibilities and deliverables for the safety program.

16.1.3 Safety Assessment Report (SAR)

The Contractor shall prepare a Safety Assessment Report (SAR) that identifies all safety features and inherent ESOH hazards, and establishes special procedures and/or precautions to be observed by Government test agencies and system users.

The assessment shall address each variant/configuration within the family of JLTVs.

The SAR shall include a description and evaluation of each hazard and the actions taken to eliminate, mitigate, or control the associated mishap risk.

The mishap risk associated with each hazard shall be evaluated and classified by severity and probability of occurrence before and after mitigation in accordance with MIL-STD-882D and the System Safety Program Guidance.

16.1.4 Hazard Tracking Log (HTL)

The Contractor shall prepare a Hazard Tracking Log (HTL) in accordance with the System Safety Program Guidance.

The contractor shall include ESOH hazards identified through hazard analyses, evaluations, risk assessments and testing.

The HTL shall track the status of all hazards throughout the life cycle of the system.

A central file or document called a Hazard Log (HL) HTL shall be maintained on the ACE.

16.1.5 Disposition and Closeout.

All hazards shall receive final disposition by the Government. All hazards closed out in the log shall identify the Government official who authorized the closeout. Closed out Hazards shall remain on the Hazard Log.

17 ENVIRONMENTAL COMPLIANCE

17.1 Environmental Compliance

The Contractor shall ensure that all aspects of contract execution, to include activities associated with design, prototype build, test, and storage, are in compliance with Federal, State, and Local environmental regulations and requirements.

The Contractor shall immediately notify the Contracting Officer if the Government gives any direction that could result in permit violations.

17.2 Hazardous Materials (HAZMAT) Management

Asbestos, beryllium, Class I and Class II Ozone Depleting Substances, radioactive materials, hexavalent chromium, cadmium, mercury, lead or other highly toxic or carcinogenic materials, as defined in 29 CFR 1910.1200, shall not be used in the manufacture, assembly, maintenance or sustainment of the JLTV.

The JLTV shall be designed in such a way that the use of benzene, N-butyl alcohol, toluene, dichloromethane, trichloroethylene and xylene are not required during maintenance or sustainment of the vehicle.

17.2.1 Exceptions to Hazardous Materials Requirements

Waivers from the hazardous materials requirements shall not be permissible except where a suitable alternative does not exist.

Waivers shall be submitted in accordance with the Request for Deviation RFD process (TBD). RFD documentation requesting a waiver (TBD) shall include detailed technical justification for the use of the prohibited hazardous materials.

RFDs related to hazardous materials requirements shall be submitted no later than 30 days prior to CDR.

Lead-acid batteries and lead solder shall not be used without approval from the Government.

Any requests for lead shall follow the RFD process.

Hazardous materials requirements shall apply to any components/parts purchased through a subcontractor/vendor, COTS components, OEM parts, and manufactured parts.

17.2.2 Hazardous Materials Management Report (HMMR)

The Contractor shall prepare a Hazardous Material Management Report which shall identify all hazardous materials required for system manufacture, assembly, operation and sustainment, including identification of the parts/processes that require them.

This report shall be prepared in accordance with National Aerospace Standard 411, section 4.4. (Exception to NAS 411, Section 4.4.1: Hazardous materials used in the system manufacture and assembly shall be identified in addition to those delivered on the vehicle and required for operation and support.)

The report shall include a listing of prioritized hazardous materials for minimization/elimination, and identify those hazardous materials/processes for which non-hazardous substitute materials/technologies may be available for implementation.

The HMMR shall specify which phase (manufacture, operation, and/or sustainment) for which each material is required and identify the part or process for which the material is used.

Status, changes or issues with the HMMR shall be discussed as a part of each technical review and program management review.

18 HUMAN SYSTEMS INTEGRATION (HSI) / MANPOWER & PERSONNEL INTEGRATION (MANPRINT)

18.1

The Contractor shall address the human systems elements during the design and development of all JLTV sub-configurations. These elements are further defined in the Purchase Description.

18.2 Human Factors Analysis

The Contractor shall conduct a human factors analysis of the deliverable JLTV sub-configurations and submit a technical report of crew functionality and crew task loading with and without the B kit installed.

- The report shall include at a minimum evaluations of the field of view, providing polar plots in 3 dimensions defining actual field of view of the operator and of the composite view of all crew.
- The report shall include at a minimum operation of all doors and hatches the push/pull forces required (including during emergency situations such as after a roll-over).
- The report shall include at a minimum the crew space claim and head clearances.
- The report shall include at a minimum ingress/egress time.
- The report shall include at a minimum worst case shock and vibration loads for each seat under all design operating conditions.
- The report shall include at a minimum evaluation of the capability to attain and maintain internal cab temperatures specified in the Purchase Description.
- The report shall include at a minimum operation of all controls and displays.

19 SUPPORTABILITY/INTEGRATED LOGISTICS SUPPORT (ILS)

19.1 Supportability

The contractor shall plan and conduct an Integrated Logistics Support (ILS) Program (supporting U.S. Army and U.S. Marine Corps) which shall govern the management of the ILS effort.

The ILS effort shall be conducted as an integral part of the design, development and integration process to define the range and depth of the required support, and address all applicable and related elements of logistics.

Included in that effort would be commonality between variants as well as commonality with DOD and commercial sectors through the use of subsystems and components already in the DOD system or commercially available to the maximum extent practical in terms of cost, schedule and performance goals.

Reference Documents to be utilized for the ILS SDD/Milestone B areas of support are: Logistics Supportability Planning and Procedures in Army Acquisition, DA PAM 700-56, and dtd. April 2006 and Department of the Navy Guide for Conducting Independent Logistics Assessments ILA Handbook dtd Sep 2006.

19.1.1 Integrated Logistics Support (ILS) Manager

The contractor shall designate, as a key person in contract performance, an ILS Manager who shall possess sufficient authority to manage, direct, execute and control all ILS elements of the contract.

The ILS Manager shall have adequate authority and influence within the organization to integrate ILS considerations throughout the systems engineering process.

19.1.2 Integrated Logistics Support (ILS) Plan

The contractor shall utilize the following ILS elements:

a) Maintenance Planning

Level of Repair Analysis (LORA).

The contractor shall examine the Military Occupational Specialty (MOS) skill set(s) and conduct a comparative non-economic analysis against the Maintainability Task Analysis (MTA).

The contractor shall make recommendations identifying tasks to be performed by the Operator/Crew versus Field and Sustainment levels to include rationale.

b) Manpower and Personnel

c) Supply Support

d) Support Equipment

The contractor shall provide a listing of support equipment, which is defined as tools, test equipment, automatic test equipment, and Built-in Test/Built-in Test Equipment (BIT/ BITE) using items currently in the Government inventory to the maximum extent practical.

e) Technical Data

f) Training and Training Support

g) Computer and Computer Support

h) Facilities

i) Packaging, Handling, Storage, and Transportation (PHS&T) (including Naval Integration and Transportability)

j) Design influence

The contractor shall develop an Life Cycle Sustainment Plan that provides details on how all logistics elements will be integrated to minimize life cycle costs utilizing all the ILS elements of support as found in AR 700-56 (paragraph 2-2) and SECNAV Instruction 5400.15B.

19.1.3 Performance Based Logistics (PBL)/ Business Case Analysis (BCA)

The contractor shall participate in Government PBL/BCA IPTs to assist the Government in determining the best value PBL support alternative.

19.1.4 Supportability Demonstration (SD) Plan

The contractor shall develop and submit for government approval a SD Plan.

The SD Plan shall contain the Government and Contractor cooperative plans and procedures for a combined demonstration of the logistic supportability of the system.

The SD Plan shall contain a statement of demonstration objectives and the qualitative and quantitative requirements to be demonstrated.

The contents of the plan shall contain a description of the demonstration conditions.

The following areas shall be addressed:

- a. A listing of tasks to be demonstrated. (See tasks associated with the SD under C.19.1.4).
- b. Demonstration conditions including the following:
 - (1) The principal operating modes, operating time and cycling conditions to be imposed.
 - (2) The mode of operation during the demonstration considering configuration and mission requirements.
 - (3) Demonstration constraints such as manpower (by number and skill level), test equipment and their relationship to the eventual use of the items.
- c. The types and quantities of equipment and materials to be used including Government Furnished Equipment (GFE).
- d. The maintenance concept.
- e. Schedule of events.
- f. Provisions for a pre-demonstration phase to prepare facilities, personnel and equipment for the formal demonstration.
- g. Expected results, including the following:
 - (1) The method to be used to report test levels.
 - (2) The data expected from each test along with the recording methodology and definition of ILS data elements to be collected.
 - (3) Analytical methods and calculation procedures to be used to analyze demonstration data.
 - (4) The criteria for classifying demonstration results as successes or failures. Definition of failure must relate to expected symptoms, which will be observed by operators and by maintenance personnel.
- h. The plan of action to be used when demonstration failures occur.
- i. The participating agencies include:
 - (1) Organization.
 - (2) Degree of participation by each in terms of managerial, technical, maintenance, and operating personnel.
 - (3) Assignment of specific responsibilities.
 - (4) Qualifications, quantity, sources, training and indoctrination requirements needed for the personnel participating in the SD.

19.1.5 Supportability Demonstration (SD)

The contractor shall plan and conduct a Supportability Demonstration (a.k.a. Logistics Demonstration (LD)) at the contractor's location, using tools found in current military tool sets to verify the supportability requirements identified in the JLTV Government Life Cycle Sustainment Plan and to identify any needed improvements to materiel design for improved supportability and reduced lifecycle cost.

The SD will be divided into two phases, one at the beginning of the Engineering & Manufacturing Development Phase (EMD) to identify and mitigate high-risk logistics areas and a second one during the Low Rate Initial Production (LRIP) phase.

The SD shall be a non-destructive disassembly and reassembly of the JLTV FOV to demonstrate that all logistics considerations and requirements identified in the Purchase Description have been satisfied.

The contractor shall perform all work necessary to develop, fabricate and deliver the System Support Package (SSP) that will be evaluated and approved by the government during the SD. Operator and maintenance personnel performing the SD will be trained and equipped as specified by the logistic concept being tested and will be representative of personnel described in the target audience description.

The SD will be performed to evaluate the achievement of the following:

19.1.5.1 Supportability Demonstration Test Report

The contractor shall develop and submit a SD test report documenting the results of the SD.

The contractor shall provide a "hot wash" or quick look report immediately following the SD to the program office in addition to the official final SD test report

19.1.5.2 Maintainability Strategy & Goals

Review the design to verify achievement of maintainability goals and to identify supportability deficiencies.

The JLTV shall not degrade current Joint Services (U.S Army, U.S Marine Corps, SOCOM, U.S. Air Force, U.S. Navy, and U.S. Coast Guard) maintenance plans. Additional maintenance planning necessitated from design changes/updates/modifications shall be based upon the Government's level of maintenance structure.

For new or changed parts, components, or assemblies, the JLTV contractor shall determine the most effective and efficient procedures for performing maintenance, identify the extent of maintenance action for each repairable item, and identify the maintenance level to perform maintenance tasks.

Variables, such as repairable item price, down-parts price, and failure rate of repairable item, labor costs, costs of tools and TMDE, and test program costs shall be considered.

19.1.5.3 System Support Package (SSP)

Evaluate the SSP to include the interface of Test, Measurement, and Diagnostic Equipment (TMDE) and other support equipment with the end item.

19.1.5.4 System Safety

Review of the design to ensure identification of operation and maintenance hazards, and confirm the safety of all procedures and tasks.

19.1.5.5 Equipment Publications

Review and verification that the draft equipment publications IAW MIL-PRF-32216 include:

- (1) **Fault Diagnosis:** Confirm fault diagnostic/prognostic procedures and testability using built-in test/built-in test equipment (BIT/BITE), Automatic Test Equipment (ATE) and software programs, and external Test, Measurement, and Diagnostic Equipment (TMDE).
- (2) **Maintenance Tasks and Procedures:** Confirm the calibration procedures, maintenance tasks and repair/replacement procedures through the removal and replacement of the component parts for the system, system TMDE, and support equipment.
- (3) **Illustrations:** Verify all illustrations match actual equipment configuration as well as proper sequencing for disassembly and assembly procedures.

19.1.5.6 Task and Skill Requirements

Confirm and demonstrate task and skill requirements for operator/crew and for maintenance personnel as identified in the JLTV Purchase Description (PD) to successfully complete the EMD Phase.

19.1.5.7 Maintenance Time Standards:

Confirm maintenance time requirements as defined in the JLTV Purchase Description (PD) for maintenance functions through performance of the task by properly trained military maintenance personnel.

19.1.5.8 Training Curriculum

Training curriculum verification.

19.1.5.9 Transportability Requirements

Transportability and Naval Integration verification.

19.1.5.10 Commonality

JLTV will share common parts among the JLTV FoV and other DOD systems to the maximum extent practical in terms of cost, schedule, and performance goals. Threshold = Objective: The JLTV FoV shall maximize commonality between the Mission Role Variant (MRV's) and sub-configurations.

19.1.6 Government Furnished Equipment (GFE)

The Government will notify the contractor of the availability of GFE [TBD].

Items will be provided to the contractor within 90 days of receipt of the contractor's written request to the PCO.

The contractor shall provide for accountability, security and storage for the GFE COMSEC provided.

The contractor shall inspect, inventory and store (this includes having an approved COMSEC account and approved storage area) all GFE received and identify and report any discrepancies/deficiencies.

19.1.7 Self-Diagnostics

Existing Government Self-Diagnostics equipment and software shall be used to the maximum extent possible.

The health monitoring data from the J1939 and other available data busses shall be collected by an existing PM TMDE on board Wireless Diagnostic Sensor (WDS) and transmitted to an on board Vehicle Computer that will use existing PM TMDE Vehicle Integrated Diagnostic Software (VIDS) to assess JLTV operational health and provide status to both operators and maintainers of the JLTV FOV.

Considerations for the installation of the WDS are:

19.1.7.1 Analog signals embedded in the digital bus (NO DCA)

The A Kit shall include the mounting bracket for the Vehicle Computer (VC), the power cable interface from the vehicle to the VC, and the Wireless Diagnostic Sensor-Digital (WDS-D).

The WDS-D module will mate to the vehicle 9-pin Deutsch diagnostic connector (this should have already been specified per our earlier recommendations) and it requires 1.5 inches radius of clearance from the center of the connector plus a height of 2.5 inches to mount.

The diagnostic connector shall also be mounted in a location that would allow the connection and routing of a serial cable to the VC as a backup in case the WDS-D is not used.

For system designs with multiple diagnostic connectors, the same criteria would apply to each of them.

19.1.7.2 DCA

The A Kit shall include the mounting bracket for the Vehicle Computer (VC), the power cable interface from the vehicle to the VC, and the Wireless Diagnostic Sensor-Analog (WDS-A).

The WDS-A module will mate to the DCA and it requires 1.5 inches radius of clearance from the center of the connector plus a height of 4 inches measured from the base on the DCA connector to mount.

The DCA should also be mounted in a location that would allow the connection and routing of a serial cable to the VC as a backup in case the WDS-A is not used.

For vehicles designed with digital diagnostic connectors, the criteria listed above would apply to each of them.

19.1.7.3

Standard Test Maintenance and Diagnostic Equipment (TMDE) for the Army is the Maintenance Support Device (MSD) and for the USMC it is the Vehicle Automated Diagnostic System (VADS). It will host the JLTV Interactive Electronic Technical Manual and be used for At-Platform testing by field level maintainers.

19.2 Reliability Program

Reliability must be designed into a system from the inception of the design process.

The contractor shall demonstrate how reliability, and specifically the precepts of Reliability Centered Maintenance (RCM), will be integrated into the systems engineering process from the start.

The contractor shall execute a tailored Reliability Program to ensure the JLTV FOV meets supportability and sustainment goals and objectives.

The reliability system shall be monitored throughout the period of performance to identify and assess any changes which would impact product data, sustainment planning and sustainment execution derived from Reliability Program analyses.

The program shall encompass all aspects of reliability with respect to the selection of components, predications, and testing.

The contractor shall maintain and make available to the Government all reliability data on all vendor or subcontractor supplied items and shall inform the Government of all parts or components, which will degrade system reliability requirements.

Pre-existing reliability data shall be used to the maximum extent possible. The contractor is encouraged to apply MIL-HDBK-470A as guidance.

The Reliability Program shall include the following tasks:

19.2.1 Failure Modes, Effects & Criticality Analysis (FMECA)

The contractor shall prepare a FMECA to identify all system failure modes. Failure modes resolved by inherent built-in test (BIT) capabilities shall be identified in the analysis.

For all failure modes not resolved by BIT, this analysis shall identify the Single Point of Failure (SPOE) or fault group of maintenance-worthy items applicable to the mode based upon the system architecture.

The failure effects to the system shall be identified in addition to the criticality level of each failure (in-operational or degraded). In the event of a degraded effect, the contractor shall identify the operational/inoperable functional capabilities.

Failure indications/symptoms to the operator/maintainer shall be detailed within the report. FMECA findings shall be applied during the conduct of Maintainability Task Analysis.

The contractor shall prepare a FMECA report in accordance with (SAE JA 1011/1012) and using BCP.

19.2.2 Reliability-Centered Maintenance (RCM) Analysis

An independent RCM analysis shall be conducted at the Governments discretion on the system after completion of testing and before award of the production contract.

The contractor shall be required to provide up to 480 hours engineering and technical support requiring active participation in a government run RCM analysis on the system and a subsequent RCM audit.

An RCM process which is fully compliant with SAE JA 1011 (Evaluation Criteria for RCM Processes) and SAE JA 1012 (a guide to the RCM Standard).

Particulars pertaining to a required RCM analysis and RCM audit will be addressed in the contract as a contract line item deliverable.

The contractor shall be required to have an individual attend a 3-day RCM Introductory Course and participate in the RCM analysis and subsequent RCM audit.

Government personnel and the contractor will audit the RCM analysis results and the proposed recommendations will be provided to the program manager and the contractor for consideration into the maintenance plan and preventive maintenance requirements.

19.3 Publications

The contractor shall provide technical manuals (TMs) of sufficient quality that will provide the Government test community sufficient information to ensure a safe certification process and that will allow the Government test employee's to test the Contractor's JLTV prototypes.

The TMs shall represent:

- (1) Operator (to include driving restrictions) and Operator/Crew Maintenance necessary to support the configuration of the vehicle being tested.
- (2) Field Level Maintenance, to include a Maintenance Allocation Chart (MAC) necessary to support the configuration of the vehicle being tested. [The maintenance TMs should be in government work package format and shall be delivered in both hard copy and in electronic format \(MS Word\). Eight \(8\) copies in each format shall be delivered to the PM JLTV, and eight \(8\) copies to each Test Center\(s\) concurrent with vehicle delivery to the test site. One hard copy set of TMs shall be over packed with each vehicle delivered under this contract.](#)

19.3.1 Definitions

19.3.1.1 Operator/Crew

[The U.S. Army & the USMC view Operator/Crew preventive maintenance as sustaining the equipment in a mission capable status that is both preventive and corrective in nature. It normally entails inventory, cleaning, inspecting, preserving, lubricating, adjusting, testing and replacing component parts using minimal on-board tools.](#)

19.3.1.2 Field Level of Maintenance (LOM)

The U.S. Army & the USMC view Field level as sustaining equipment in a mission capable status to restore equipment to a specified condition that is both preventative and corrective in nature. Field level actions include inspection, diagnosis (in-depth), modification, replacement, adjustment, and limited repair and disposal of principal end items and their selected repairable components and sub-components as on-system repair and return-to-user using minimal on-

board tools. Those tasks do not consist of disassembly of a component (primarily Line Replaceable Units (LRU's)/Line Replaceable Modules (LRM's) replacement).

19.3.1.3 Sustainment (LOM)

The U.S Army & the USMC view Sustainment LOM as sustaining equipment throughout its lifecycle by performing major repair, overhaul, or complete rebuild of parts, subassemblies, assemblies or principal end items to include manufacturing parts and conducting required modifications, testing, calibrating, and reclaiming. Service depots, commercial industrial facilities, original equipment manufacturers or a combination thereof may perform Sustainment LOM. Sustainment LOM also supports lower level maintenance by providing overflow maintenance services, and by performing on site maintenance services including technical assistance, when required.

19.3.2 Interactive Electronic Technical Manuals (IETM)

It is the intent of the JLTV FOV Program to require full Interactive Electronic Technical Manual (IETMs) after the production contractor is selected with development occurring during the Production Phase. However, for this portion of the prototype contract the contractor shall create and deliver to the Government a mini IETM (content and level TBD) using Next Generation (NG) and Electronic Maintenance System (EMS) software. The product provided for review will include IETM troubleshooting and intrusive testing and data bus interrogation to help the mechanic accurately isolate the fault, link to the appropriate maintenance procedure and link to the appropriate parts information. The intrusive testing will minimally include the following subsystems: Engine, Engine history data storage, transmission, and suspension to include the adjustable suspension. This mini IETM (content and level TBD) shall allow the Government to assess the contractor's ability to meet the requirements for Full IETM development, to support Initial Operational Capability (IOC), during the Production phase. Information on IETM development can be found in MIL-STD-40051-1, information on XML authoring and structure can be found in MIL-STD 2361C.

19.3.2.1

The IETM shall be capable of running on an on-board computer and on an off-board handheld/laptop.

The embedded training module shall be seamlessly integrated with the IETM so that the appropriate personnel can receive context-sensitive training at any point within the IETM. The contractor shall develop, provide, maintain and support technical data for operator maintenance, troubleshooting, and Repair Parts and Special Tools Lists (RPSTL) in the system repository.

The contractor shall maintain the repository for configuration management of maintenance procedures, training data, and other data necessary to support vehicle maintenance.

19.3.2.2 Copyright Release

The Contractor shall identify copyrighted material. The Contractor shall furnish appropriate copyright release giving the Government permission to reproduce and use copyrighted information. When the Contractor uses a manual, which covers a third party vendor's

component(s) or a portion thereof, and the third party vendor's manual contains copyrighted material, the Contractor shall be responsible for obtaining a copyright release from the third party vendor and providing the copyright release to the Government.

19.4 System Support Packages

The contractor will provide a System Support Package (SSP) for Testing (SSP-T) at each test location that includes all the necessary components, sub-components, and parts required to maintain the JLTV FOV prototypes during testing at all test locations.

The contractor will provide a list of parts (called a System Support Package List (SSPL) for Testing (SSPL-T), by government national stock number (if provisioned), contractor part number, manufacturer, description, and in what quantity, to the Government for Government use (CDRL).

Government use means: Government understanding those items that the contractor may consider expendable or having a high failure replacement rate during testing which must facilitate Government monitoring the number of times a component, sub-component, and part is replaced.

The contractor will be allowed to provide replacement items not identified in the SSP-L-T or the SSPL-T, within 24-48 hours of identified/ confirmed test need.

The contractor will deliver to the Government, the SSP-L-T NLT 90 days prior to shipping the SSPL-T to the test site(s) (CDRL).

The contractor shall assemble, furnish, and ship (to include packing, packaging and transportation) the SSPs to each designated test site(s) to arrive NLT 30 days prior to the test vehicles.

19.4.1 Tester Training / Operator/Crew

The contractor shall provide sufficient training to familiarize the Government's test operator/crew to ensure proficient and safe operation the JLTV FOV prototypes during test and evaluation using MIL-PRF 29612 and AR 602-2 as a guide. Operator/Crew maintenance is found in C.13.3.1.1.

19.4.2 Tester Training / Maintenance

The contractor shall provide sufficient training to familiarize the Government's testing personnel to maintain the JLTV prototypes per the definition of what is expected of Field level maintainers.

19.4.3 Tester Training

The tester training shall consist of 25% classroom and 75% on-vehicle training.

19.5 Packaging, Handling, Storage and Transportation

The Contractor shall be responsible for preservation and packaging of the deliverables under the terms of this SOW.

Packaging data shall be developed in accordance with MIL-STD-2073-1 for long term storage and ASTM D3951 for items to be used immediately and scheduled for domestic shipment.

Items must be preserved to protect materiel against environmentally induced corrosion and deterioration, physical and mechanical damage, and to provide the level of protection to prevent damage or deterioration during shipment, handling, and storage of materiel.

19.5.1 Hazardous Materials (HAZMAT)

The contractor shall be in compliance with the requirements outlined in Federal Regulation 49 CFR for transportation and FED -STD-313 for packaging of all HAZMAT materials.

19.6 Source Data for Forecasting Diminishing Manufacturing Sources and Material Shortages (DMSMS)

The contractor shall identify, as applicable, the parts planned to be used as well as those used in the product at all indentured levels.

The data may be obtained progressively during any program life cycle phase using sources such as the preferred parts list, bill-of-materials, vendor surveys, inspections, etc.

The information documented at the part level shall be updated as the design progresses or changes and be sufficient to enable forecasting and management of any associated DMSMS issues.

The contractor shall establish a proactive program to identify configuration items, including spare parts, subject to Diminishing Manufacturing Sources and Material Shortages (DMSMS), and obsolescence.

The contractor shall prepare a DMSMS Plan using Best Commercial Practices (BCP).

The plan shall present the screening/forecasting tool and method, and present a projection covering a minimum of five (5) years into the life cycle, identify when a DMSMS or obsolescence risk may impact the configuration baseline, and develop recommend risk mitigation action(s). Upon identification of a DMSMS or obsolescence risk, the contractor shall develop and provide recommended action plan(s) to mitigate the risk impact to system availability, schedule and cost.

The contractor shall progressively assess DMSMS and obsolescence and convey this information along with recommended action plans, including alternative sources, parts, costs, etc. to the Government on a quarterly basis.

The contractor shall deliver source data to support Government forecasting of DMSMS risks. Source data shall be to the lowest configuration item indenture as detailed within the configuration management baseline.

The contractor shall participate in the no-cost Government/Industry Data Exchange Program (GIDEP).

The contractor may visit www.GIDEP.org to initiate participation in the GIDEP. Proactive application of GIDEP is encouraged. The contractor is encouraged to visit www.dmsms.org for DMSMS guidance.

The contractor shall serve as a member of the DMSMS Management Team (DMT) and provide a status of DMSMS issues at all Logistics, Design and Program Reviews.

At the conclusion of the LVSR contract, the contractor shall provide to the Government all DMSMS related materials (databases, analysis, obsolescence notices, etc.) related to the JLTV program that were developed during the design and production of the JLTV vehicles.

19.7 Configuration Management (CM)

The contractor shall use the Government's CM Plan for the JLTV CM program.

19.8 Supply Support Strategy

In the future, during the Production development Phase, it is the Government's intent to fully provision all variants of the JLTV in time to meet the Government fielding plan.

During JLTV development the Contractor will be authorized to use Government Sources of Supply (SOS) under the terms of this contract. For items managed by Defense Logistics Agency (DLA), the Contractor will be authorized to purchase class IX parts directly from DLA, via use of a Contractor Furnished Materiel (CFM) Department of Defense Activity Address Code (DODAAC). Use of DLA as a SOS, or any other government SOS, does not relieve the Contractor of any performance metric, as stated in the contract. Contractors utilizing DLA as SOS will also be authorized to leverage other DLA supply chain services, such as, distribution and stock positioning, etc. via individual partnering arrangements with DLA.

In the future if the Government Supply System does not have sufficient parts provisioned, or in stock to meet the fielding, it is the intent of the Government to use Interim Contractor Logistics Support (ICLS) until the supply system can support the fielding and sustainment of the variants. Should ICLS be required the contractor will be required to collect and provide parts usage data during the ICLS period (first 2-3 years).

19.9 Parts Screening

The contractor shall establish procedures and controls to ensure products obtained from suppliers, vendors, and sub-contractors do not deter from the overall reliability and HAZMAT requirement of the JLTV.

19.10 Training

19.10.1 Manpower, Personnel and Training

The Contractor shall provide a training program in accordance with current Army/ USMC curriculum standards in accordance with (IAW) MCO 1553.3A and MIL-PRF-29612.

19.10.2 Instructional Level

The Contractor shall develop courses in sufficient depth to meet the following requirements.

19.10.3 Operator Course Requirements

The course shall provide students with a knowledge and understanding of the system's capabilities, functions, limitations, interfaces, operations, and shall include at a minimum Preventive Maintenance Checks and Services (PMCS), capabilities and function of the system, and Operations/Operator Maintenance.

The course shall allow the student to become proficient with the required operational tasks.

The course shall ensure that students are qualified to meet current USMC licensing requirements.

At a minimum, the hands-on instruction shall include and, upon completion, enable the student to: operate the system, subsystem, and equipment controls; demonstrate knowledge of general equipment functions and operations; perform system checks and verification procedures.

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19.10.4 Maintenance Course Requirements

The course shall provide students with a knowledge and understanding of the capabilities, limitations, interfaces, and operations, and the preventive and corrective maintenance tasks/skills required to successfully complete the MOS-producing school.

At a minimum, the instruction shall include: capabilities, functions and operation of the system; preventive and corrective maintenance procedures; external diagnostics and other tests; and measured performance data.

At a minimum, the instruction shall include and upon completion, enable the student to: operate the system and subsystems; execute diagnostic self-test and interpret readouts; remove and install major components and perform pre-shop setup tests; determine if the system/subsystem is malfunctioning or not; isolate and locate malfunctions in the Line Replaceable Unit (LRU); replace the defective LRU; troubleshoot and repair LRU; perform all required alignments and adjustments; verify proper system/subsystem functions; perform routine preventive maintenance functions.

The course shall be developed around the Government maintenance concept and shall allow the student to become proficient with the required operations and the preventive and corrective maintenance tasks.

The course shall be of sufficient depth to ensure that students are qualified to maintain the system to the appropriate level using the technical manuals, general purpose test equipment, and all available diagnostics.

The course shall include a capability for the insertion of instructor-inserted faults or malfunctions.

19.10.5 Methods of Instruction

The preferred methods of instruction are lectures, demonstrations, practical exercises and application.

Fault isolation shall be accomplished by having students identify faults to the specific LRU and/or software configuration item with particular emphasis on high failure items.

The trainee to instructor ratios shall be no greater than 5:1 for practical exercises and 40:1 for lectures.

19.10.6 Course Material

All course material shall be prepared IAW MCO 1553.3 and MIL-PRF-29612. The reading level at which written training material is developed shall be the eighth grade reading level.

The Contractor shall provide, to each student attending Instructor and Key Personnel (I&KP) courses, a copy of all course material required to teach the course.

The Contractor shall provide all supplies, test equipment, common and special tools, and technical literature to each Government student while taking the course.

Test equipment shall be identical to that used in the operational environment. For further guidance MIL-HDBK-29612 may be used.

19.10.7 Learning Analysis Report (LAR)

The Contractor shall provide a LAR containing the mission statement and course objectives. It shall also contain the Learning Objectives (Terminal Learning Objectives and Enabling Learning Objectives) and the knowledge, skills, and attitudes required to perform the tasks.

19.10.8 Lesson Plan (LP)

The Contractor shall provide a LP to the Government that shall contain data that provides specific definition and direction to the instructor on learning objectives, equipment, instructional media requirements, and the conduct of training.

19.10.9 Trainee Guide (TG)

The Contractor shall provide a TG that shall contain data that enhances the trainee's mastery of the knowledge, skills, and attitudes needed for a given subject. These materials may be in the form of information, diagram, job, assignment, problem, and outline sheets.

19.10.10 Instructional Visual Aids

The Contractor shall provide visual aids, such as slides and transparencies, to be used by the instructor in the conduct of classes. They shall enhance the learning process and be in accordance with Government approved production standards.

19.10.11 Test Package

The Contractor shall provide the specific requirements data necessary for the examination of an individual's knowledge, skills, attitudes, and achievement of each enabling learning objective. All examinations shall include practical exercises or demonstrated successful troubleshooting, maintenance, repair, operation, test, installation, and assembly.

19.10.12 Instructional Media Package (Audiovisual)

The Contractor shall provide the general plan or approach to the video production, individual types of scripts to be used, storyboards, audio scene data, audiovisual production plan, prototype audiovisual, Edit Decision List, original videotape material, adjunctive media, and program media.

19.10.13 Instructional Media Package (Instructional Media Data)

The Contractor shall provide the instructional media data files and applications used to design, develop, produce, maintain, and modify the instructional media.

19.10.14 Initial Training

The Contractor shall develop training material (courseware) to cover operator and maintenance tasks for the JLTV.

The Contractor shall be responsible for Initial Training and all the courseware to support it. Training and courseware shall cover the operation, maintenance and repair of all components and ancillary equipment (if any) unique to the JLTV.

Initial Training shall be conducted at the Contractor's facilities or a mutually agreed upon site.

The Government reserves the right to inspect the Contractor's training facilities.

Initial Training shall be in three evolutionary increments: Instructor and Key Personnel Training (I&KP), IOT&E, and New Equipment Training (NET).

19.10.15 Instructor and Key Personnel Training

The Contractor shall conduct I&KP training at the Contractor's facility utilizing the Government approved draft courseware. I&KP training shall consist of courses for operators and maintainers.

The Contractor shall conduct, at a minimum, two classes for a maximum of 20 students each for the operator course and two classes for a maximum of 20 students each for the maintainer course.

These courses shall be targeted to the personnel who will maintain the system up to the intermediate level of maintenance. Course length is subject to Government approval.

Following completion of I&KP training, approved Government comments received from attendees shall be incorporated into the courseware to yield an improved product.

19.10.16 Initial Multi-Service Operational Test and Evaluation Training

The Contractor shall conduct I Multi-Service OT&E training courses at the Contractor's facility for a maximum of 40 students (20 operators and 20 mechanics).

These courses shall be targeted to the personnel who will operate and maintain the system up to the organizational level of maintenance.

The I Multi-Service OT&E courses shall be taught by the Contractor utilizing draft courseware. Course length is subject to Government approval.

Approved Government comments received from attendees of the IOT&E training courses shall be incorporated into the courseware to yield an improved product.

19.11 Provisioning

19.11.1 Provisioning Guidance Conference (PGC)

The Contractor shall host the PGC within XX days after production contract award and furnish provisioning data as one product of the PGC at mutually agreed upon intervals prior to the provisioning conference(s).

The Government will clarify any provisioning issues during the evolution of the data cleansing process.

19.11.2 Provisioning Conference

The Contractor shall host quarterly Provisioning Conferences at the Contractor's facility. The Contractor shall provide and disassemble production grade equipment, as deemed necessary by the Government, during these conferences to validate and verify all provisioning documentation.

19.11.3 Provisioning Plan

The Contractor shall establish, manage, and execute a Logistics Management Information (LMI) program in accordance with MIL-PRF-49506. MIL-HDBK-502 may be used for additional guidance.

The LMI program shall be the basis for the integration of the logistics support element, and provide the interface between the engineering and integrated logistics effort used in the systems engineering effort.

The objectives of the LMI program are to provide optimum material readiness, economical logistics support, and identify/evaluate resources required to develop and manage an effective support system.

All design, modification/alteration, and engineering activity shall require LMI. Provisioning status, identification of problem area(s), and necessary resolutions to problems addressed shall be discussed at each ILSMT/IPT.

19.11.4 Logistics Management Information (LMI) Data

The contractor will provide initial and ongoing updates of the JLTV bill of materiel parts data. Access to contractor parts data and changes to information will enable Government Sources of Supply (SOS) to procure the most current materiel configuration over the life cycle of the vehicle.

19.11.5 Provisioning and Other Pre-procurement Screening Data

Provisioning and other Pre-procurement Screening Data is used to identify existing National Stock Numbers (NSNs) for an item, validate status of an NSN, and aid in maximum use of known assets.

The Contractor shall identify provisioning and other pre-procurement data to be submitted for Government screening.

19.11.6 Spares Acquisition Integrated with Production (SAIP)

Spares acquisition shall be integrated with production.

The Contractor shall prepare and submit a SAIP list that contains all maintenance significant field spares and repair parts for procurement concurrently with the JLTV production item procurement.

The SAIP list shall be in keeping with the maintenance philosophy of the JLTV. The Contractor shall submit the SAIP list for each production year.

The list shall include:

- a. Description/Nomenclature
- b. Vendor
- c. Vendor part number
- d. Manufacturer
- e. Manufacturer part number
- f. CAGE code
- g. Price per unit
- h. Quantity per system
- i. NSN (if applicable)
- j. Maintenance Replacement Rate I
- k. Essentiality Code
- l. Lead time for delivery

19.11.7 Provisioning Technical Documentation

The Contractor shall develop/document Provisioning Technical Documentation to include a Provisional Parts List (PPL), Long Lead Time Items List (LLTIL), Tools and Test Equipment List (TTEL) (as required), Common and Bulk Items List (CBIL), and any Design Change Notices (DCN). These lists shall contain the Data Products selection list.

The Government at the PGC shall designate the format and medium of delivery.

The frequency for submission of such lists shall also be designated at the PGC.

MIL-PRF-49506 shall be used as the guidance document for the creation of the Provisioning Database using the latest version of Marine Interactive Computer Aided Provisioning System (MICAPS) software.

Delivery of the Provisioning Database to the USMC will be accomplished via exporting a data file from the latest version of MICAPS software in MIL-PRF-49506 format.

19.11.8 Item Logistics Data Record

In the event Engineering Data for Provisioning is not available or is inadequate, the Contractor shall provide an ILDR in accordance with FED-STD-5, Section 7; MIL-PRF-49506.

19.11.9 Drawings

Thirty days post completion of IOT&E the Contractor shall provide system drawings for the JLTV. These drawings shall also be submitted, as required, whenever a configuration change causes an alteration or revision to these drawings.

The latest revision of drawings shall be delivered to the Government throughout the life of the contract.

19.11.10 Provisioning Parts List (PPL)

The PPL shall contain the end item, component or assembly and all support items which can be disassembled, reassembled, or replaced, and which, when combined, constitutes the end item, component or assembly and shall include items such as parts, materials, connecting cabling,

pipings, and fittings required for the operation and maintenance of the end item, component, or assembly.

The PPL is a tool used to determine the range of support items required to maintain the end item for an initial period of service.

This shall include all repairable Commercial Off-the-Shelf (COTS) items unless excluded by the provisioning requirements.

It shall not include a breakdown of GFE.

The PPL shall include items such as parts, materials, connecting cabling, piping, and fittings required for the operation and maintenance of the end item/equipment.

The PPL shall contain repair kits and repair parts sets required to maintain the end item, component, or assembly equipment unless excluded by the provisioning requirements or meeting the requirement for CBIL inclusion if CBIL is a contract requirement.

19.11.10.1 Item Unique Identification (IUID)

The Contractor shall implement specific IUID marking, as defined in MIL-STD-130M and DFARS clause 252.211-7003.

The IUID marking shall be incorporated into existing data plates.

Bar coding and the two-dimensional IUID data matrix shall be machine-readable with common optical scanning devices and be accompanied by the corresponding human readable markings when practical.

This provides a valuable tool for asset tracking from acquisition through manufacture as well as item life cycle management.

The following items shall be marked by a data plate that contains the IUID data matrix; (whenever practicable, the location of the marking on the item shall ensure its readability during normal operational use):

- Principal End Item
- Sub Assemblies
 - a) Engine
 - b) Transmission
 - c) Winch
 - d) Crane
 - e) Transfer Case
 - f) Steering Gear Box
 - g) Differential Assembly/Axles

19.11.10.1.1 IUID Data Plate

All data plates shall be permanently affixed.

Data plates shall be marked with a two-dimensional IUID data matrix defined in MIL-STD-130M.

The vehicle data plate shall use MIL-STD-130M, Figure 1, as a guide.

All data plate information shall also include human and machine-readable bar coding.

19.11.10.1.2 Data Plate Information

The minimum data plate information for motor vehicle end items is listed below:

- Nomenclature
- USMC/ Army Vehicle Registration Number
- NSN
- Design Activity: (MFR ID Cage Code)
- Serial Number: (VIN)
- Government Ownership Designation: US PROPERTY
- Contract Number:
- Two-dimensional IUID data matrix encoded information shall be on the data plate for the principal end item. The UID data matrix shall be no less than one centimeter (1 cm) wide and no less than forty percent (40%) in contrast.

19.11.10.1.3 Subassembly Data Plates

At a minimum, subassembly data plates shall have human and machine-readable bar code and IUID data matrix information as follows.

For subassembly items that do not currently utilize a data plate, the contractor shall refer to MIL-STD-130M to develop best business practices for display of the below data elements.

All applications must be permanently affixed, as well as, human and machine-readable.

- Part number
- Serial number
- Manufacturer cage code
- Two-dimensional UID data matrix

20 RELIABILITY, AVAILABILITY, MAINTAINABILITY (RAM) PROGRAM

20.1 RAM Program

The Contractor shall develop, implement, and maintain a comprehensive RAM Management Program.

The management program shall establish a process to satisfy the JLTV supportability and sustainment standards set forth in the Purchase Description.

The Contractor shall develop RAM predictions and analysis as required to ensure compliance with the Purchase Description.

The program shall include all aspects of reliability, availability, and maintainability with respect to design selection of components, allocation predictions, subsystem interfaces impact, testing results, reliability growth projections, and Condition Based Maintenance Plus (CBM+) concepts, including Reliability-Centered Maintenance (RCM) processes and decision logic, as required by DoD Instruction 4151.00.

The Contractor shall maintain and make available to the Government all RAM data on any vendor or subcontractor supplied item and shall inform the Government of any mission or safety-critical component as determined using RCM processes.

The system design shall be monitored throughout the entire period of performance to identify and assess the need for corrective actions to any incidents that would adversely impact RAM.

Reliability Centered Maintenance concepts shall be utilized to identify all hidden and evident failure modes on critical components along with planned corrective actions.

All failure modes shall be addressed with appropriate corrective action if the failure would impact mission availability or exceeds the MTTR requirements.

All mission or safety-critical failure modes shall be addressed in the Diagnostics system with appropriate response and corrective action.

Using RCM, the Contractor shall identify all limited-life components and propose the appropriate cost-effective replacement policy.

The replacement policy shall ensure that the limited-life components maintain an adequate level of reliability throughout the systems lifecycle.

The RAM management program shall minimally include the following:

20.1.1 RAM Case Report

The Contractor shall develop and maintain a RAM Case report.

The Case Report shall support the Contractors claim in meeting or exceeding the RAM requirements specified in the Purchase Description.

The RAM Case Report shall summarize the Contractor's approach and framework for providing progressive assurance that the system will meet the reliability requirements specified in the purchase description.

The Contractor shall also identify how Reliability Best Practices are being incorporated to design RAM into the platform and systems early in the design process to achieve the RAM requirements.

The RAM Case Report shall include the rationale for RAM analysis (modeling, simulation, and testing), RAM metrics, evidence to support metrics, and how the RAM analysis supports the system design.

20.2 RAM Predictions

The Contractor shall provide detailed design reliability and maintainability predictions based on a defined design configuration.

The RAM predictions shall be allocated down to the subsystem level and shall be update each time a design or mission profile change significantly impacts the JLTV or any of its subsystems.

Reliability block diagrams shall be used at the subsystem level to roll the reliability and maintainability predictions up to the system level.

Reliability centered maintenance concepts and fault tree analysis shall be used to identify potential failure modes and their function, mission, and safety consequences, and to determine the appropriate response (e.g., redesign, provide redundancy, define maintenance action/program).

If appropriate, an integrated approach to design out specific failure modes shall be implemented early in the development process.

The Contractor shall conduct thermal and vibration analysis to identify potential failure modes.

The Contractors shall characterize critical loads and stresses identified in their design.

Supporting data reports shall be submitted in accordance with Reliability Prediction and Documentation of Supporting Data (TBD).

Reliability Block diagrams shall be submitted in accordance with Reliability Block Diagrams and Mathematical Models Report (TBD).

At a minimum, the following supporting data shall be included and integrated into the vehicle design:

1. Reliability Block Diagrams (RBD)
2. Fault Tree Analysis
3. Failure Modes and Effects Criticality Analysis (FMECA)
4. Physics of Failure (PoF)
5. Dynamic and/or static design modeling and simulation
6. Finite element analysis (FEA)
7. Environmental stress screening (ESS)
8. Critical Technologies and high rating FMECA sub-systems shall be identified.
9. Testing shall be conducted at the component level prior to the delivery at the Government test site.

20.2.1 Test Deficiencies

The Contractor shall address any test deficiencies and failures identified during Government RAM testing in accordance with Section E, TEST DEFICIENCIES/FAILURE.

Failure modes generated during Contractor testing or component level testing shall be tracked in a FRACAS database.

This metric information shall be available to the Government and discussed at IPT meetings.

All impacting incidents shall be investigated to uncover the root cause that contributed to the failure.

The root cause and the suspect item shall be checked with reliability prediction analysis tools to verify the failure mode was identified and the incident reflects the output of the original analysis.

If the failure mode was earlier identified, there shall be an established corrective action plan.

If the failure mode was not previously identified in the reliability prediction analysis, the analysis shall be revised and the Contractor shall establish a corrective action plan to remediate the failure mode.

20.3 RAM Modeling and Analysis

The Contractor shall identify components whose failures will result in a hardware mission failure (HMF), safety risk/hazard or unscheduled maintenance action that affects the operational availability or has high repair/replacement costs, as a critical component.

For the identified critical components, the Contractor shall analyze the critical component to ensure sufficiently high reliability to meet the reliability requirements specified in the Purchase Description.

For the critical components, the Contractor shall provide the following information:

1. Whether the component failure would result in a hardware mission failure, a safety/risk hazard, or an unscheduled maintenance action affecting operational availability, or has high repair/replacement costs.

2. Analysis method used on critical components.
3. A characterization of the local loads and stresses (vibration, shock, thermal, or electrical) that impact the reliability of the component.
4. FEA model analysis results of the critical component, as appropriate.
5. Component test plans and analysis of test results.
6. Predictions for time/miles, cycles, or hours-to-failure for each critical component based on engineering analysis.
7. Design improvement recommendations.
8. Performance changes over time and a recommended approach for replacement before failure. This approach shall include a method of detection to monitor the component wear or life.
9. Reliability growth analysis and predictions. The Contractor shall prepare and deliver a top-down indenture reliability report to include the identification of the Mean Miles between Hardware Mission Failures (MMBHMf), or appropriate alternative metric, for each maintenance-worthy item in addition to identification of the system's MMBHMf. Application of MIL-HDBK-217 as guidance is encouraged.

20.4 Diagnostics

The Contractor shall identify the diagnostics included in their system in order to obtain the maintainability thresholds and objectives set forth in the Purchase Description (section title, Reliability, Availability, and Maintainability).

The diagnostics list shall include an initial analysis of how each candidate will impact the system's operational availability prediction.

21 GOVERNMENT FURNISHED EQUIPMENT (GFE) AND INFORMATION (GFI) INTEGRATION AND INSTALLATION

The Contractor shall integrate all mission equipment to include GFE, Contractor Furnished Equipment (CFE) and Contractor Developed Equipment (CDE).

Integration shall include providing space, power, weight allocation, heat load, cabling, and cableways, all through hull connections, all other hardware and software interfaces and CFE mission equipment necessary to meet the requirements as stated in the Purchase Description.

21.2 GFE/GFI List

A list of the types and quantities of GFE and GFI shall be found in Attachment (TBD).

22 MANUFACTURING AND PRODUCTION READINESS PLANNING

The Contractor shall utilize Manufacturing Readiness Levels (MRL) and conduct Manufacturing Readiness Assessments (MRA) using the definitions, criteria and processes defined in MIL-HDBK-

896 Manufacturing and Quality Program dated 8 Aug 2008 and DoD MRL desk book dated 3 Jan 2010 as a guide.

MRAs shall be conducted at the frequencies specified in the IMP.

The first MRA shall establish a baseline from which progress will be measured.

MRAs shall be led by the Government Program Office at the prime contractor's facilities.

The prime contractor shall lead MRAs at Tier 1 sub-contractors and include Government Program Office participants.

Contractor readiness for production of the JLTV FoV shall be measured and described using MRLs, which are defined in Section 2 and Appendix A of DOD MRL desk book.

Contractors shall conduct a self-evaluation, using MRLs, to describe their production readiness for the JLTV FoV using the criteria described in sub-Section C.22 of this SOW.

Contractors shall address sub-systems identified by the Government using the same criteria.

The Contractor shall monitor and provide status at all program reviews for in-house and Tier 1 sub-contractor MRLs and shall re-assess MRLs in areas for which design and process changes have occurred which could impact the MRL.

The Contractor shall develop and implement a Manufacturing Maturation Plan (MMP) detailing how the Contractor will achieve MRL 8 by PRR.

The first draft of this plan shall be submitted at the Start of Work Meeting (SOWM) with emphasis on those sub-systems that have been assessed as being below MRL 6 by SOWM.

The MMP shall be completed IAW the Government provided IMP and the information shall be available to the Government and discussed at IPT meetings.

The Contractor shall develop, for sub-systems in which the readiness level is expected to be lower than MRL 8 by the Production Readiness Review (PRR), a MMP detailing how it will achieve MRL 8 by LRIP.

The plans to reach MRL 8 shall be submitted at the PRR.

Prototype articles manufactured during EMD shall be made in an environment as representative of production as is practical - using production representative materials, components, tooling, facilities and personnel.

The Contractor shall include how the environment that the EMD test vehicle are built in mitigates and reduces production risks for LRIP by the PRR.

The Contractor shall report on the progress of this effort during technical reviews and make any data created available to the Government per the IMP.

22.1 Technology and Industrial Base

Contractors shall conduct an analysis of the capability of the national technology and industrial base to support the design, development, production, operation and uninterrupted maintenance support and eventual disposal of the JLTV FoV.

As a minimum contractors shall provide evidence that have achieved an acceptable level of technology maturation by completion of contract.

As a minimum contractor shall provide evidence that the industrial capability and capacity are adequate to support the Program needs.

As a minimum contractors shall provide an analysis of the potential impacts this Program may have on the Industrial base.

22.2 Design

Contractors shall provide an assessment of the maturity and stability of the evolving system design and any related impact on manufacturing readiness.

As a minimum the contractors shall provide evidence at CDR that the system design has stabilized sufficiently to allow commencement of the pilot line proofing.

As a minimum the contractors shall show that alternative design approaches were considered that accounted for design for manufacture.

As a minimum the contractors shall provide confirmation that the tooling design plan will meet the schedule of this phase and then for full rate production.

22.3 Materials

Contractors shall require to conduct and provide an analysis of the risks associated with materials (including basic/raw materials, components, semi-finished parts and sub-assemblies).

At a minimum contractor shall identify the maturity of the materials being utilized and if immature detail the mitigation plan to improve maturity.

At a minimum contractor shall identify any material availability issues.

At a minimum contractor shall identify any special handling issues.

At a minimum contractor shall provide an analysis of the Contractor Supply Chain management system.

22.4 Cost and Funding

The Contractor shall develop and demonstrate auditable estimates for expected Unit Production Cost based on the FoV concept to include all sub-configurations and companion trailers (approximately 50% Payload Category A, 10% Category B, and 40% Category C), based on projected production quantities of approximately 60,000 systems to be delivered over an 8- year span, using the Contractor's delivered prototype designs.

Contractors shall provide an analysis of the adequacy of funding to achieve target manufacturing maturity levels and examine the risks associated with reaching manufacturing cost targets.

Contractors shall also provide detail that the JLTV Program is meeting Design to Unit cost goals.

Contractors shall also identify the unit cost drivers.

Contractors shall also develop a cost reduction plan.

22.5 Process Capability and Control

Contractors shall conduct an analysis of the risks that the manufacturing processes may not be able to reflect the design intent of key characteristics (repeatability and affordability).

At a minimum, contractors shall to identify the process requirements and develop a Variation and Variability Reduction Plan.

22.6 Manufacturing Personnel

Contractors shall provide an assessment of the required skills, availability and numbers of personnel to support the manufacturing effort.

The manufacturing effort shall also include a plan to implement the special skills required, if any, and list any training/certification that is to be initiated.

22.7 Facilities

Contractors shall provide an analysis of the capabilities and capacity of key manufacturing facilities (prime, subcontractor, supplier, vendor and maintenance/repair).

As a minimum contractors shall identify facility requirements/needs.

As minimum contractors shall identify if specific facilities will be in place and validated.

As a minimum contractors shall define the production flow.

22.8 Manufacturing Management

Contractors shall provide an analysis of the integration and management of all elements needed to translate the design into an integrated and fielded system meeting Program goals for affordability and availability.

In conjunction with the analysis contractors shall develop a Manufacturing Plan, to be updated throughout EMD.

In conjunction with the analysis contractors shall develop a Tooling Design Plan including schedule to meet the needs of full rate production.

23 INTERNATIONAL

(TBD).